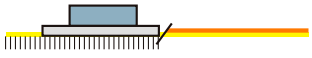
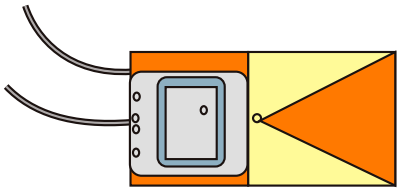
Wearable Antennas:
Epaulet Pouch Combined GPS/ Soldier Radio Antenna

Overview:
Natick Soldier Center, a subordinate activity of the U.S. Army Research, Development and Engineering Command, is conducting efforts to integrate antenna capabilities into textile materials and Soldier equipment. Traditional antennas were not designed for wearable applications. The 30-inch whip antenna extends 2 feet above the head compromising detection avoidance measures. The easily detectable presence of the antenna draws unwanted attention to communications personnel, is easily broken, and gets caught in terrain elements. Textile antenna integration technologies will provide the Warrior with fully integrated, body conformal, and visually covert antennas to improve communications, increase situational awareness and improve mobility. The potential for signature reduction increases the potential for enhanced lethality.

Description:
The overall objective for this effort is to develop a Soldier position independent navigation (GPS) and communications (Soldier Radio) antenna system that can be integrated into or easily appended to the Modular Lightweight Loadcarrying Equipment (MOLLE), helmet cover or helmet. The requirements, goals and guidelines for the program are being coordinated with MegaWave Corporation the developer of the antenna system. Preferred physical location of the antennas between the MOLLE and helmet is being considered along with avoiding locations and identifying areas with little or no interference from other items carried such as grenade pouches etc. Also the size and type of feed cables to the antenna system are being considered. This effort assessed various commercial and modified commercial antennas to enable wearable versions. Antenna types investigated included patch and dipole configurations, several GPS, dual function, and miniature planar antennas. The feasibility of obtaining position independent coverage through the use of multiple patches and position sensitive switches is also being investigated. Conformal helmet designed antennas are also being analyzed since the back of the helmet was determined to be the best location to provide omni-directional coverage in any Soldier position.

Status:
A survey of commercially available miniature patch, GPS and other frequency band antennas was conducted with the following results: For GPS, samples of miniature, planar, dielectric-loaded patch antennas, both amplified and passive were evaluated when mounted on a small (40×40 mm) flexible, thin (3 mil) ground plane. For the Soldier Radio antenna, a grounded line planar antenna was evaluated at 433 MHz and scaled to the 1750-1850 MHz band. Alternative off-the-shelf separate miniature patch antennas were also investigated to use as a combined dual band patch that covers both GPS and the Soldier radio bands. Designs of this type of dual antenna suggest that the physical size would be reasonable for the Soldier worn application. The capability was proven to incorporate the Combined GPS/Soldier Radio antenna into a textile-based pouch for the MOLLE vest or within the helmet for Land Warrior, Future Force Warrior, and Future Warrior Systems.





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